

MANAGEMENT OF BUILDING PROJECTS

PhD. prof. Niko Majdandžić
Faculty of Mechanical Engineering
University of Josip Juraj Strossmayer in Osijek, Slavonski Brod

Tadija Lovrić
Informatic engineering-ININ, Slavonski Brod

Mr.sc. Vido Perić
Vibrobeton d.d., Vinkovci

Summary

In this work we have shown the concept of logistic support in management in building production and in building of objects, which is realised in Enterprise resource Planning – ERP system ERPINSRG, developed in Informatic firm Informatic engineering – ININ in Slavonski Brod, and in cooperation with scientists of catedra for informatics of Faculty of Mechanical Engineering and users from building firms.

Key words: manufacturing logistic, management, ERP systems, ERPINSRG

Introduction

European society for logistic defines logistic [1] like “organising, planing, management and fluctation of business, starting with development and procuration to production and distribution towards final customers order for purchase, in that way that all conditions of market are satisfied with minimal costs”.

Informatization of company represents one of main development assignments with purpose of achievement competition of product or service in price, delivery term and quality. Implementation of ERP system as highest level of business, technical and production integration, with informations and planing, and monitoring of the work, affects on rising of total technological and organization level of the company. In that way introduction of controlling is possible, as preparation function for successful work of company management. ERP systems are integrating in their work models of modern logistic support to production and dealings (SWOT analysis, methods of evaluation and trends in controlling, MRP, MRPII, JIT, SIGMA6, methods of planning and dating, methods of multi-criterion optimisation), allowing to management receiving of alternative for options in taking certain business action.

Beside trying for development of uviversal ERP systems [2] the practise has shown existing of certain demands and needs which follows from technology of work

in every company apropos configuration of preparational, business and productional processes in every arm of industry.

There are two ways of development of ERP systems in manufacturing companies in different arms of industry:

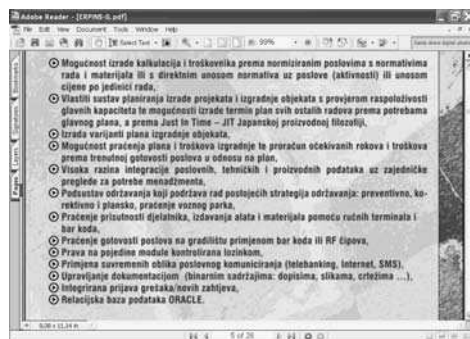
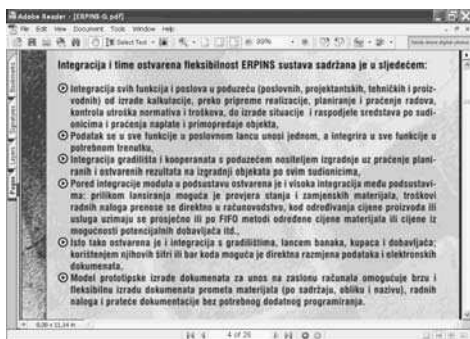
- Projecting and development ERP systems in manufacturing companies in different arms of industry [3] so it exists (example with firm of Informatic engineering - ININ) ERPINSM for metal-working industry, ERPINSD for wood-working industry, ERPINSP for nutrition and process industry and ERPINSG for building manufacturing and construction of objects.
- Adaptation of finished universal ERP system to special demands in every arm of industry

Special demands which are posting in building industry and construction of objects are:

- Demands for making calculation towards prescription for finished products with addition of indirectly costs which are arranged by certain keys, and also dynamic elaboration of calculation during prepare for projecting of objects and parts of object
- Needs for following of objects as the place of costs (direct and indirect) and as a carrier of costs and also organisation units which participate in realization of objects and costs by that organisation units
- Making plan of objects building with need of fine terminning of special critical capacities, possibility of rebalance of the plan towards to present condition of realization and evaluation of expected costs and building deadlines.

1. Content of Erpinsg system

On the picture 1 there are shown subsystems of ERPINSG system which satisfies mentioned demands and needs of building industry.

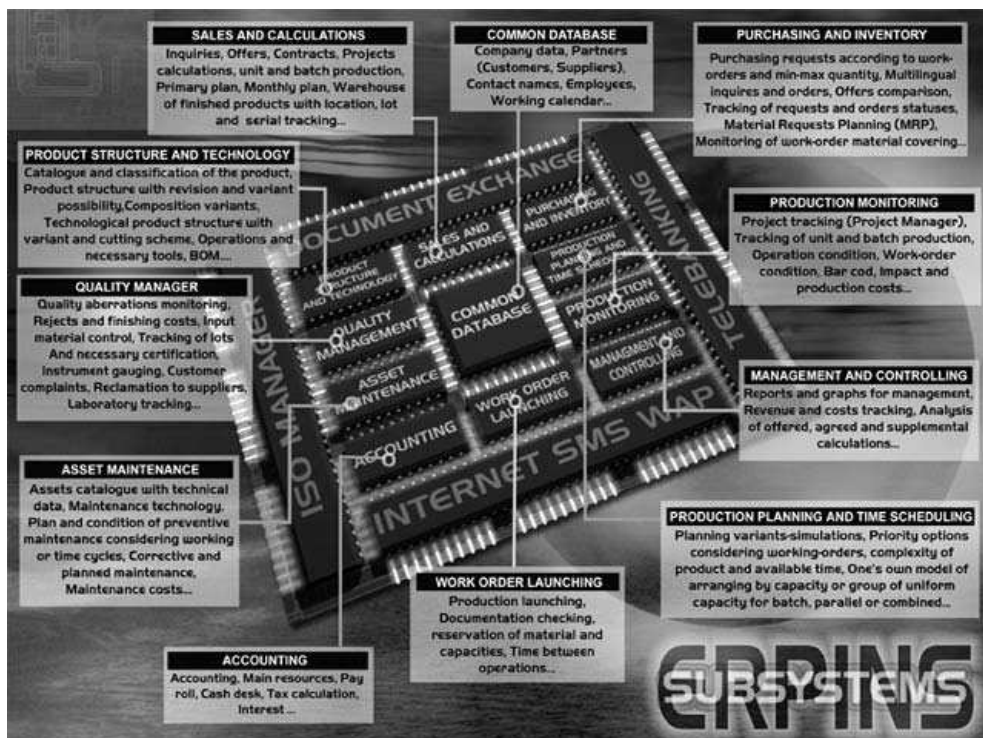


(translation follows)

Integration and realised flexibility by intergration of ERPINS system is contained in next:

- Intergration of all functions and businesses in company (business, engineering, technical and production) from making of callculation, through preprement of realisation, planning and monitoring of works, control of normative and costs consumprion to making of situation and distribution of means by participants and monitoring of payment and transmission of object,
- Input of data in every function in business chain is made once and it is beeing integrated in all functions in needed moment,
- Integration of the construction site and sub-contractors with company who carries the building with monitoring of planned and realised results on construction of objects by all participants,
- Besides of integration of modules in subsystem, it is realised high integration between subsystems: during launching it is possible to check the stage and replacement materials, costs of working orders are transfered directly in accountancy, in defining of the price for product or services we take average or by method of FIFO with defined price of the material or price from possibilities of potential suppliers etc.
- In the same way it is also realised integration with construction sites, bank chains, buyers and suppliers; by using of their codes or bar-code, direct exchange of data and electronic documents is possible,
- Prototype of document making for input on the computer screen provides fast and flexibile document making of material traffic (by contest, shape and name), work orders and following documentation withouth need for extra programming.
- Possibility of callculation and bill of quantities making by normative work and materials business or with direct input of normatives by businesses (activities) or by input of the price by work unit,
- Proper planning system of making of the projects and building of the objects with checking of main capacity avilability and with possibility of making of term plan of all other works by needs of main plan, and by Just In Time – JIT Japaneese productional philosophy,
- Making of various plans of building objects,
- Possibility of plan and construction costs monitoring and also callculation of expectable dead lines and costs by current efficiency of works according to plan,
- High level of business, technical and productional integration of data with collective overview for management needs,

- Subsystem of maintenance which supports work of existing strategies of maintaining: preventive, collective and planned, monitoring of vehicle fleet,
- Monitoring of employees presence, dispensation of tools and materials with hand terminals and bar code,
- Monitoring of work efficiency on construction site by using of bar code or RF chips,
- Claim on certain modules which is controlled by password,
- Usage of actual shapes of business communicating (telebanking, Internet, SMS),
- Managing of documentation (binary contents: memos, pictures, drawings...),
- Integrated report of mistakes/new requests,
- Relation data base ORACLE.



Picture 1 Subsystems and module of ERPINSG system

Containing following subsystems:

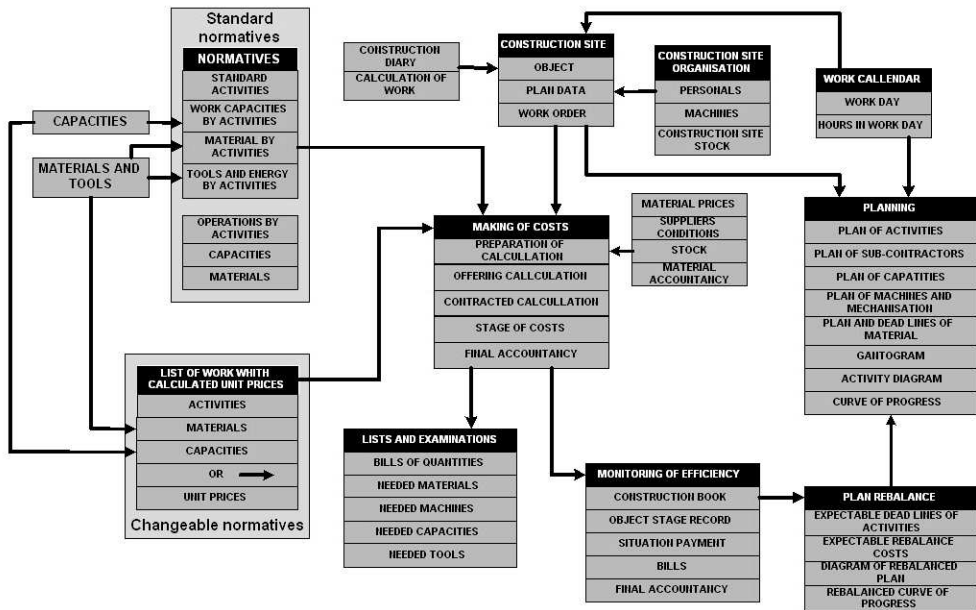
- Collective data base (BAza ZAjedničkih Podataka) – BAZAP (contains collective data : organisation structure and hierarchy, partners and contact persons data, employees data, lists of rates of exchange, collective working calendar or working calendar by construction sites, dictionary of data and collective classification codes, measure units)
- Sales and comercial (PROdaja i Komercijala) – PROKA (contains data and programs for work of functions for sale, calculation and opening of work orders, and also provides: getting bill of quantities of object and servicesa, opening and following orders from customers, getting of the plan and efficiency of work orders and dailiy assigments, making of yearly plan and following of it's realisation, following of accomplishment by organization units, objects, construction sites and sub-contractors, following of tendered, contracted and retrospectived calculation as also incurred costs, automatic billing towards bill of lading or construction book.
- Normatives of work and material (NORMAtivi rada i materijala) – NORMA (contains basic data of standard works, normatives of works and normatives of materials by each business, operations by each business, possibiliy of withdraw of the price of the material from the material accounting, possibilities or conditions of suppliers or by direct input, the prescription of material by products and variations of prescription, technology of making of the products and work in process, technology for calculation)
- Aquisition and stock of matarial and extra parts (NAbava i ZALihe materijala i rezervnih dijelova) – NAZAL (contains data about stage of basic, accessory and spent material, state of work in process and products on the construction site, choice of optimal supplier, background for preforming of inventory process, possibility of organizing high regular stok and also enterance and exit of material and products by using RF terminal and marking with bar code)
- Launching of work orders (LANsiranje RAdnih naloga) – LANRA (contains possibility of interactive creating of work orders for starting of production, assemblage of production, services of maintaining and transport, businesses in sub-contracting, following of scheduled and realised costs by work orders, checking of needed material by prescription for scheduled quantities on work order, reserving of materials by work orders, possibility of using alternative materials, automatic making of production-technological documentation: technological maps, capitulations for deliverance of finished products and work in proces, deliverance for needs for materials towards prescription)
- Managing of building objects (UPRavljanje izgradnjom OBjekta) – UPROB (contains possibilities of making scale of charges on three levels: making of list of

activities without planning of activities, making of scale of charges by schedule of activities, making of scale of charges by term of schedule of all sub-contractors and by basic schedule, following of direction of scheduling, corrections in scale of charges, report of additional works and excess works by scale of charges)

- Monitoring of construction site (PRAćenje Gradilišta) – PRAG (gives the possibility of monitoring of changes on construction sites: time, employees, progress of the works, work of capacity, employees and mechanization, report of efficiency is made on the list of works or activity of schedule by direct input or by input a bar code, also by automatic created construction book and after that the situations for collection and bill are occurring)
- Insurance of quality (OSiguranje KValitetE) – OSKVE (contains data about deviation of quality, costs of bad quality, certificates of materials and products, complaints of customers, complaints of suppliers, results of trial and finishing tests, calibration of measuring devices and instruments)
- Maintaining of capacity and mechanization (ODržavanje KAPaciteta i mehanizacije) – ODKAP (gives the possibility of scheduling and monitoring of work for preventive and planned maintaining, monitoring of correctional maintaining, following of scheduled and realised costs of maintaining, accounting of reliability and availability of the equipment, finding of weak spots, defining of necessary spare parts)
- Accountancy information subsystem (Računovodstveni INformacijski podSustav) – RINIS (represents integrated support to accountancy and finance businesses in company with modules: Diary of accounting, main book, closing of item, internet banking, transfer and automatic accounting of exit bills – IFA, book of UFA, IFA with automatic printing of credit transfer, calculation of taxes, calculation of payments, long-term property, minute inventory, good-materially, accountancy with automatic transfer of currency from stock, cash desk, credit transfer, calculation of interest, working accountancy, automatic account of situation)
- Management and controlling (MEnadžment i KONtroling) – MEKON (contains selected review and reports about stage of making business and production: balance sheet, plan of intake and outtake, stage of staff by structure, stage of stocks, total and reserved by work orders, cover of arranged businesses with material, planned and realised production, planned and spent hours of work, stage of realization by work orders, stage of arrears and debts for certain period, review of arranged and businesses in contracting, costs of deviation from quality, expences of maintaining, graphic display of doing business and stage on stock.)

2. Managing of object building

Object building is connected with all the activities in preparation, production and setting of objects on construction sites. The report of working time expense, capacity and mechanization is done in production drive and in construction sites. On picture 2 it is shown work schema of managing system in building of objects.



Picture 2 Schema of managing system in building of objects

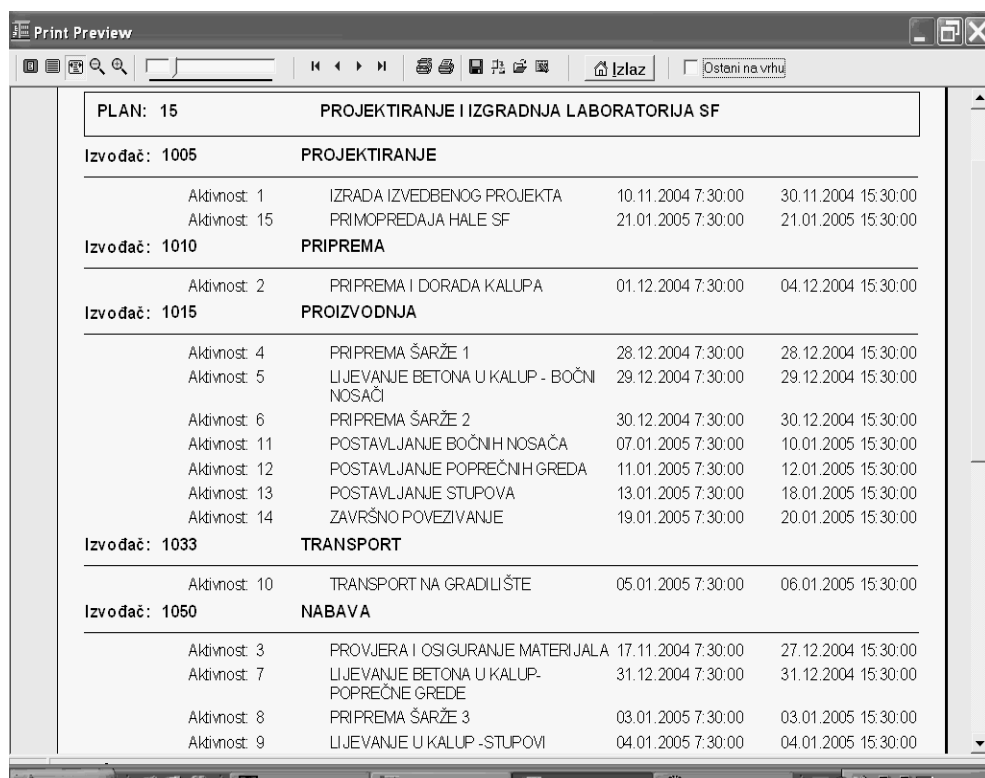
Managing is beeing done in following steps:

- Preparation and input or choice from standard works of activities in building of new object
- Input of work and material normatives if there are no standard works
- Making a bill of quantities and his corrections
- Input basic data about objects and construction site
- Making a plan of building of object, plan of sub-contractors, plan of mechanization, plan of needed materials, plan of tools, ferries and equipment, showing plan with gantt chart, curve of progress, plan by all involved, plan for certain period of time
- Report of efficiency (by bar code or input of percent of efficiency, or efficiency in measure unit by activities or directly from efficiency in construction book)

- Automatic making of construction book, construction diary (by report of the work on object), situation collection, final accounting and bills
- Monitoring of realization by quantities of the work and value (arranged-realised), billing and charging, and final accounting with showing added and excess works
- Monitoring of realisation and costs (direct and indirect) of organization units which are involved in making of object
- Making of plan rebalance with prognosis of new deadlines and costs on realisation of the object.

Making of plan and plan rebalance is managed with original program system by algorithm, which is developed on Faculty of Mechanical Engineering in Slavonski Brod [5].

On picture 3 it is shown the part of the plan by organization units.



PLAN: 15		PROJEKTIRANJE I IZGRADNJA LABORATORIJA SF	
Izvođač: 1005 PROJEKTIRANJE			
Aktivnost 1	IZRADA IZVEDBENOG PROJEKTA	10.11.2004 7:30:00	30.11.2004 15:30:00
Aktivnost 15	PRIMOPREDAJA HALE SF	21.01.2005 7:30:00	21.01.2005 15:30:00
Izvođač: 1010 PRIPREMA			
Aktivnost 2	PRIPREMA I DORADA KALUPA	01.12.2004 7:30:00	04.12.2004 15:30:00
Izvođač: 1015 PROIZVODNJA			
Aktivnost 4	PRIPREMA ŠARŽE 1	28.12.2004 7:30:00	28.12.2004 15:30:00
Aktivnost 5	LIVJEVANJE BETONA U KALUP - BOČNI NOSAČI	29.12.2004 7:30:00	29.12.2004 15:30:00
Aktivnost 6	PRIPREMA ŠARŽE 2	30.12.2004 7:30:00	30.12.2004 15:30:00
Aktivnost 11	POSTAVLJANJE BOČNIH NOSAČA	07.01.2005 7:30:00	10.01.2005 15:30:00
Aktivnost 12	POSTAVLJANJE POPREČNIH GREDA	11.01.2005 7:30:00	12.01.2005 15:30:00
Aktivnost 13	POSTAVLJANJE STUPOVA	13.01.2005 7:30:00	18.01.2005 15:30:00
Aktivnost 14	ZAVRŠNO POVEZIVANJE	19.01.2005 7:30:00	20.01.2005 15:30:00
Izvođač: 1033 TRANSPORT			
Aktivnost 10	TRANSPORT NA GRADILIŠTE	05.01.2005 7:30:00	06.01.2005 15:30:00
Izvođač: 1050 NABAVA			
Aktivnost 3	PROVJERA I OSIGURANJE MATERIJALA	17.11.2004 7:30:00	27.12.2004 15:30:00
Aktivnost 7	LIVJEVANJE BETONA U KALUP- POPREČNE GREDE	31.12.2004 7:30:00	31.12.2004 15:30:00
Aktivnost 8	PRIPREMA ŠARŽE 3	03.01.2005 7:30:00	03.01.2005 15:30:00
Aktivnost 9	LIVJEVANJE U KALUP - STUPOVI	04.01.2005 7:30:00	04.01.2005 15:30:00

Picture 3 Part of the plan on construction of the halls SF by departments

Special problem for monitoring of costs by objects and productional organisation units represents unsolved ways of indirect costs distribution.

3. Model of indirect costs distribution by objects

In most of the companies (by the research on project of MZOŠ 152001) we monitor and distribute only direct costs by objects and organisation units. In this costs are entering work costs (through calculations of salary and monitoring of the employees work and productional capacity by objects apropos in organisation units) and costs of material (through delivery note with average price from material accounting or by method of FIFO).

However, meaningfull costs remains excluded (costs of electric energy, gas, wather, costs of sub-contractor services) as also special indirect costs (costs of management, preparation, support and administrative activities etc.). Special part represents services between themselves (maintaining of equipment, transport) whitch represents internal realization for organisation units of support activities and cost for object and organisation units of the production.

In subsystem of management anf controlling of MEKON is developed in module of controlling a model of key construction for distribution of this indirect costs by organisation units and objects and in a module of management, model of reports and lists of incur direct and distributed indirect costs ba organisation units and objects.

On picture 4 it is shown an example for input of key for distribution of costs in module of controlling. Selection of keys and defining the part of the percent is matter of each company and as example of costs distribution of electric energy, we take installed strenght of work time waster in current month regarding on total installed energy, and costs of management are shared by the key of reached realisation and by the number of the employees in current month.

- Definiranje ključeva

Stranice Konfiguracija Tablica Zapis Polje Šifre Izvještaji Pomoć

Navigation icons: Back, Forward, Home, Search, etc.

OB_RAZ	MT	KW	POSTOTAK	BROJ_RADNIKA	NAZIV MT
200502	01	40		73	11100 PROGRAM ARMIRANO-BETONSKE KONSTRUKCIJE
200502	02	20		18	11200 PROGRAM PRAGOVA
200502	03	20		16	11300 PROGRAM BETONSKE GALANTERIJE
200502	04	15		27	11400 PROGRAM GRAĐENJA
200502	05	5		7	11500 PROGRAM TRGOVINA
200502	06	0		11	12200 TRANSPORT
200502	07	0		15	12500 MEHANIZACIJA
200502	08	0		56	11110 PROIZVODNJA ABK
200502	09	0		28	11111 ARMIRAČI ABK
200503	01	40		73	11100 PROGRAM ARMIRANO-BETONSKE KONSTRUKCIJE
200503	02	20		18	11200 PROGRAM PRAGOVA
200503	03	20		16	11300 PROGRAM BETONSKE GALANTERIJE
200503	04	15		27	11400 PROGRAM GRAĐENJA
200503	05	5		7	11500 PROGRAM TRGOVINA
200503	06	0		11	12200 TRANSPORT
200503	07	0		15	12500 MEHANIZACIJA
200503	08	0		56	11110 PROIZVODNJA ABK
200503	09	0		28	11111 ARMIRAČI ABK

Obračunsko razdoblje: 200502 Mjesto troška: 01 11100 PROGRAM ARMIRANO-BETONSKE KONSTRUKCIJE

Instalirana snaga(KW): 40

Premije osiguranja imovine (%):

Premije osiguranja osoba(broj radnika): 73

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Picture 4 Defining of the keys for distribution of indirect costs

In purpose of easier comparison, we made a groups for monitoring of costs which can be seen on picture 6.

Print Preview

Str. 1
Datum: 08.08.2005

ZA PERIOD OD 01.03.2005 31.03.2005

OSTVARENO KUMULATIV OSTVARENO ZA MJESEC

11100	PROGRAM ARMIRANO-BETONSKE KONSTRUKCIJE			
0005 400	Utrošene sirovine i materijali	...	400	
			31.016,65	27.621,68
0010 12190	Utrošeni svježi beton	...	12190	
			32.679,86	1.608,30
0015 41	Trošak vanjskih usluga	...	41	
			6.535,71	1.165,85
0020 404	Utrošeni rezervni dijelovi	...	404	
			773,66	358,91
0025 U	Trošak internih usluga pomoćnih djelatnosti	...	U	
			19.881,00	9.680,20
0040 47	Troškovi plaća	...	47	
			32.391,66	14.772,06

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Picture 5 The groups of costs for comparison

On picture 6 we have shown total results for chosen object. On accomplished direct costs, there are added and distributed indirect costs. In the same way we have shown calculatted (by component and prescription) and realised costs of material.

